Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI- EXAMINATION – SUMMER 2016

Subject Code:161601 **Date:17/05/2016**

Subject Name:Modelling, Simulation and Operations Research

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Write down essential characteristics of Operation research ? Mention different phases of operation research. 07

(b) Define (1) bounded Solution (2) Surplus Variable 03

(C) A firm is producing two product A and B. Each unit of A requires 2 kg of raw material and 4 labour hours for processing, and each unit of B requires 3 kg raw material and 3 hours of labour. Every weak, the firm has an availability of 60 kg of raw material and 96 hours of labour. Product A gives Rs. 40 profit per unit and Product B gives Rs.60 profit per unit. Formulate this problem as linear programming problem. 04

Q.2 (a) Solve Graphically 07

$Z=10X_1 + 15 X_2$

$2X_1+X_2 \leq 26$, $2X_1+4X_2 \leq 56$, $X_1-X_2 \leq -5$, $X_1, X_2 \geq 0$

(b) Use simplex method to solve following LPPs 07

Maximize $Z = 6X_1+20X_2$

Subject to $2X_1 + X_2 <= 32$, $3X_1 + 4X_2 <=80$, $X_1 >=8$, $X_2>=10$

OR

(b) What is the difference between slack, surplus, and artificial variable ? How do they differ in their structure and use? 07

Q.3 (a) Describe the transportation problem and its mathematical model with example. 07

(b) Solve the transportation problem with NW Corner method and least cost method. 07

	D1	D2	D3	D4	D5	Supply
S1	4	2	3	2	6	8
S2	5	4	5	2	1	12
S2	6	5	4	7	7	10
Demand	4	4	6	8	8	

OR

Q.3 (a) What do you understand by assignment problem ? give brief outline for solving it. 07

(b) Find the Optimal solution for the following assignment Problem. 07

	I	II	III	IV	V
A	4	6	7	5	11
B	7	3	6	9	5
C	8	5	4	6	9
D	9	12	7	11	10
E	7	5	9	8	11

Q.4 (a) What is queue ? Explain basic element of queues. Give some application of queuing theory. 07

(b) Consider he following data for the activity of the project: 07

Activity	A	B	C	D	E	F	G	H	I	J	K
Imm.Pre	-	A	B	C	B	E	D,F	E	H	G,I	J
Duration	13	8	10	9	11	10	8	6	7	14	18

Draw the network find the critical path.

OR

Q.4 (a) What is a replacement problem ? Describe some important replacement situation in computer field. 07

(b) A firm is considering replacement of machine whose cost price is Rs.10,000 07

Year	1	2	3	4	5	6	7
Operational Cost	1500	1900	2300	2900	3600	4500	5500
Resale value	5000	2500	1250	600	400	400	400

Find out after how many years should the machine replaced.

Q.5 (a) Explain the Difference between CPM and PERT ? 07

(b) Explain how would you deal with replacement of items that fail completely and suddenly? 07

OR

Q.5 (a) What is simulation ? discuss deterministic simulation model 07

(b) What is dummy activity ? Why it is needed? Differentiate between identity and logic dummies. 07

****